

DOCUMENT RESUME

ED 134 948

CS 003 204

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TITLE The Relationship between Sex Differences and Reading Ability: A Study of Children's Performance in an Israeli Kibbutz System.
PUB DATE 76
NOTE 19p.; Paper presented at the Annual Meeting of the International Reading Association World Congress on Reading (6th, Singapore, August 17-19, 1976)
EDRS PRICE MF-\$0.83 HC-\$1.67 Plus Postage.
DESCRIPTORS Cerebral Dominance; Elementary Education; Maturation; Physical Health; *Reading Ability; Reading Difficulty; *Reading Research; *Sex Differences

ABSTRACT

This study tested two long-standing assumptions in education: that reading ability in the elementary grades is differentiated by sex and that boys experience a higher incidence of reading disability than do girls. In addition, three biological explanations for this difference were tested: maturational lag, cerebral dominance, and vulnerability of the male organism. A Hebrew reading-comprehension test was administered to second graders and fifth graders in an Israeli kibbutz, chosen because of the lack of separation of boys and girls, the relative lack of differentiation of socialization practices, and the availability of uniformly maintained medical, developmental, and educational records. Results showed no differences in gender in reading level and reading readiness, in frequency of occurrence of reading disability, in maturational lag, in mixed dominance, nor in 12 selected indices of psychopathology in children. Tables of findings illustrate the text. (JH)

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THE RELATIONSHIP BETWEEN SEX DIFFERENCES
AND READING ABILITY: A STUDY OF CHILDREN'S
PERFORMANCE IN AN ISRAELI KIBBUTZ SYSTEM

SIXTH WORLD CONGRESS ON READING OF THE
INTERNATIONAL READING ASSOCIATION

AUGUST 19, 1976

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STATEMENT OF THE PROBLEM

This study tested two long-standing interrelated assumptions in American Education. First, that reading ability in the elementary grades is differentiated by sex, favoring girls. Second, a corollary assumption that boys experience a higher incidence of reading disability than girls. In general the evidence tends to lend credence to both assumptions with the exception of two British studies (Brimer, 1969; Johnson, 1974) and one German study (Preston, 1962). These three studies provide evidence for sex differences diametrically opposite to American studies and other European studies. Specifically, it is the boys, rather than the girls, who seem to be the better readers, and in turn experience a higher incidence of reading disability!

Inconsistent and contradictory findings across cultures, with respect to sex differences in reading ability and disability raise doubts about the three widely accepted biological explanations for such differences. These three biological theories: "Maturational Lag", "Cerebral Dominance" and "Vulnerability of the Male Organism", have been used by others to explain why girls are better readers than boys. In order to overcome some of the inconsistencies found in these theories, as well as the

equivocal evidence from other cultures, this study was undertaken.

The particular culture used to test these assumptions was a kibbutz¹ system within the State of Israel. This specific population is most appropriate to test hypotheses about sex differences due to their philosophy and practices. In particular the lack of separation of boys and girls and the relative lack of differentiation of socialization practices should help clarify the roles biology and socialization play in reading.

In addition, the three biological explanations of sex differences in reading performance, as put forth by American researchers, were tested with this population. The kibbutz population provided an environmental control not available in American research. Contributing to this control was the extraordinary stability of the composition of the kibbutz population as well as the greater relative uniformity of its culture. In addition to the aforementioned there were medical, developmental and educational records available which had been maintained uniformly since birth on all kibbutz members. (Kaffman, 1965).

The specific research hypotheses employed in testing these assumptions about reading were as follows:

General Reading Performance

1. Kibbutz Artzi boys and girls in grades 2 and 5 will not show significant differences in reading performance as evidenced by a comparison of the mean male reading test score to the mean female reading test score.²

¹ Kibbutz - a rural communal settlement.

² The reading test was the Ortar, "Reading Comprehension Test" developed and normed in Israel.

Maturational Lag Theory

2. Kibbutz boys beginning 1st grade will not show significant differences in reading readiness test¹ scores as compared to kibbutz girls in beginning 1st grade.

Cerebral Dominance Theory

3.a. Kibbutz boys in grades 2 and 5 classified as "reading disabilities" will not show a significant difference on a test for cerebral dominance as compared to kibbutz girls in grades 2 and 5 classified as "reading disabilities".

3.b. Kibbutz boys and girls in grades 2 and 5, classified as "reading disabilities" will not show a significant difference on a test of cerebral dominance as compared to a matched kibbutz group who are classified as superior readers.

3.c. Kibbutz boys in grades 2 and 5 classified as "reading disabilities" will not show a significant difference on a test of cerebral dominance as compared to a matched sample of kibbutz boys who are classified as superior readers.

Vulnerability of Male Organism Theory

4.a. An analysis of the medical records of kibbutz boys and girls in grades 2 and 5 defined as "Reading disability" will not disclose a higher proportion of overall pathology² for the boys as compared to the girls.

¹ Reading readiness was assessed by the Bender Gestalt Performance of each subject using the Koppitz (1975) scoring system.

² Pathology in this study is defined by Bentzen's (1963) criteria which includes: stuttering, cerebral palsy, epilepsy, mental retardation, childhood retardation, childhood schizophrenia, brain damage, premature birth and pregnancy complications, birth complication, emotional disturbance, sight defects, hearing defects.

Procedure

Administration of a Hebrew Reading Comprehension

test (Ortar, 1975) to 2nd and 5th graders was performed by native-speaking Educators. Ortar's Standardized test was developed and normed in Israel. The scores served as a basis for testing the first hypothesis, and answering the question, are sex differences in reading evident on the Israeli kibbutzim as in other Societies? These scores were further used to discriminate two sub-groups within the tested population; superior readers and disabled readers. The criterion for a 'superior' reader was a score within the 100th percentile of the Israeli norms. The criterion for a disabled reader was a score within the lowest 15% of the individual's class as well as his/her referral for reading remediation.

The two sub-groups were administered the following test for cerebral dominance:

(1) "Eyedness" - defined by the eye the child was observed to use to see through a microscope.

(a) (2) Handedness" determined by the hand the child was observed to use when/(writing (b) holding a spoon and (c) throwing a ball.

If the individual was observed to use the same hand for two of the three tasks and the hand used was on the same side as the eye used for sighting, he was considered to have "dominance". The findings for this test served as a basis for testing the Cerebral Dominance hypothesis.

In addition, these two sub-groups, differentiated by reading level, were evaluated on 12 additional indexes of pathology - (1) organic speech defects, (2) cerebral palsy, (3) epilepsy, (4) mental retardation, (5) schizophrenia, (6) minimal brain damage, (7) premature birth, (8) pregnancy complications, (9) birth complications, (10) emotional disturbance, (11) sight defects and (12) hearing defects.

This data was derived from careful examination of the medical records of the central kibbutz clinic, on these children, seen at the clinic. The kibbutz clinic is one of the few places in the Western World in which prevalence as compared to incidence of pathology might be accurately observed. The distinction between these terms will be discussed more fully in the 'conclusion' section.

The nature of this distinction permits an adequate test of Bentzen's (1963) hypothesis that pathologic conditions, including reading disability, are 3 to 10 times more frequent among elementary school boys than girls of the same grade level.

The Bender-Gestalt visual motor coordination test served as both a reading readiness and a maturational measure. Forty-two first grade boys and fifty-five first grade girls were administered this test in the beginning of the term-semester. Their scores were used as the data with which to test the "Maturational Lag" hypothesis. Koppitz's Rating System was employed on all test protocols.

Results

This research tested several theories purporting to explain sex differences and related reading performance. The intent was to investigate whether or not assigning subjects to groups by sex, is any more meaningful for purposes of understanding reading disabilities than assigning subjects at random.

The null hypothesis was emphasized because of the way most data on sex differences find their way into the literature. Most often the problem lies in the failure to report findings of no difference. We are aware, of course, that no amount of negative evidence "proves" that no sex differences exist. However, when measures do demonstrate some power, in the sense of being reliable and valid, but still do not distinguish between the sexes, there is all the

more reason to include them in a tally as genuinely negative findings. On the whole, we concur with Maccoby (1974) "Omission of negative findings is considerably more frequent than the omission of positive findings".¹

A restatement of each hypothesis, a presentation of the accompanying data analysis, followed by statements of acceptance or rejection of each hypotheses, will be the format followed for presenting the results.

General Reading Performance

Hypothesis I: Kibbutz boys and girls in grades 2 and 5 will not show significant differences in reading performance as evidenced by a comparison of the mean male reading test score to the mean female reading test score.

A 2-way analysis of variance performed on the reading test scores produced the following results:

Table I: 2-way analysis of Variance: Reading Scores by Grade and Sex

SOURCE OF VARIATION	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	2	28.907	0.336	0.999
GRADE	1	30.358	0.353	0.999
SEX	1	26.819	0.312	0.999
2-WAY INTERACTIONS	1	80.654	0.937	0.999
GRADE SEX	1	80.654	0.937	0.999
RESIDUAL	194	86.096		
TOTAL	197	85.488		

¹ Maccoby, E., Jacklin, C. The Psychology of Sex Differences
Stanford, California: Stanford University Press, 1974 (p.5)

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Hypothesis I is accepted as stated. The data point up, with great clarity that kibbutz boys and girls performed equally well on the reading test.

Additional useful information derived from an analysis of the reading test scores were: number and percent of reading disabled and superior readers amongst both boys and girls. |

Table II. Number of Reading Disabled and Superior Readers within a Kibbutz Population of 2nd and 5th grades

	N	Reading Disabled	Percent of Population	Superior Readers	Percent of Population
BOYS	107	14	13%	43	40%
GIRLS	94	12	12%	26	24%

The above findings are the reverse of the findings in other countries. A summary of the U.S.A. studies dealing with sex-ratio in reading disabilities will be presented below to point up this strong contrast.

Table III. Sex Differences in Reading Disability at Primary School Age

<u>Study in chronological order</u>	<u>Ratio:</u>	<u>Boys</u>	<u>:</u>	<u>Girls</u>
Monroe (1932)		8	:	1
Kopel & Geerded (1933)		8	:	1
Durrell (1940)		10	:	1
Olson (1949)		4-9	:	1
Bentzen (1936)		2	:	1
Critchley (1964)		5	:	1
Wyatt (1966)		9	:	1
Mumpower (1966)		3	:	1
Harris, A. J. (1970) (100)		8	:	1
Rice, 1970)	9	5	:	1
Isom (1973)		6	:	1

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Each of the three physiological theories noted earlier, purporting to explain a higher incidence of reading disability amongst boys, was subjected to empirical testing.

"Maturational Lag" was the first physiological theory to be tested. In brief, it theorizes that girls are considered to be more advanced developmentally than boys and thus are ready to learn to read sooner.

Hypothesis II - Kibbutz boys in beginning first grade will not show significant differences in reading readiness test scores as compared to kibbutz girls in beginning first grade. This hypothesis was tested through a comparison of means of Bender Gestalt test scores of boys and girls.

A "t" test was performed on these scores with the following results:

Table IV: Distribution of Bender-Gestalt Scores by Sex for a Kibbutz

SEX	N	MEAN	S.D.	<u>Age Group: of 6.0 - 6.5 year olds</u>		t	Level of Significance
				$\pm$	1 S.D.		
Boys	42	7.020	5.24	2.24 - 12.24		.5	NONE
Girls	55	6.454	5.62	2.62 - 7.62			

The hypothesis is accepted as stated. There is no evidence of significant sex differences in terms of test score means for the first graders.

The second physiological theory to be tested was the theory of "cerebral dominance". In capsule form, this theory suggests that reading disability results from lack of dominance of one cerebral hemisphere. The condition of incomplete cerebral dominance is purported to be more prevalent amongst boys than girls. It is deducted, therefore, that reading disabilities are more prevalent among boys than girls.

This theory was tested as follows:

Hypothesis III -

A. Kibbutz boys in grades 2 and 5 classified as "reading disabilities"

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will not show a significant difference on a test for cerebral dominance as compared to kibbutz girls in grades 2 and 5 classified as "reading disabilities".

B. Kibbutz boys and girls in grades 2 and 5, classified as "reading disabilities" will not show a significant difference on a test for cerebral dominance as compared to a matched kibbutz group who are classified as "superior readers".

C. Kibbutz boys in grades 2 and 5 classified as "reading disabilities" will not show a significant difference on a test for cerebral dominance as compared to kibbutz boys in grades 2 and 5 classified as "superior readers".

2-way Chi-square analysis of the data were performed for each of the preceding hypotheses dealing with cerebral dominance. The results are illustrated in the following 3 Chi-square tables:

Table V: 2-way Chi-Square Analysis of Sex by Dominance

SEX	COUNT ROW PCT COL PCT TOT PCT	DOMINANCE	NON-DOMINANCE	ROW TOTAL
Boys	Reading Disabled	7.	6	13
		53.8	46.2	52.0
		53.8	50.0	
		28.0	24.0	
Girls	Reading Disabled	6	6	12
		50.0	50.0	48.0
		46.2	50.0	
		24.0	24.0	

COLUMN TOTAL		13	12	25
		52.0	48.0	100.0

CORRECTED CHI SQUARE = 0.04340 WITH 1 DEGREE OF FREEDOM
SIGNIFICANCE = 0.8350

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Table VI: 2-WAY CHI-SQUARE ANALYSIS OF READING LEVEL BY DOMINANCE

COUNT ROW PCT COL PCT TOT PCT	DOMINANCE	NON-DOMINANCE	ROW TOTAL
READING	13 52.0	12 48.0	25 26.9
DISABLED	26.0 14.0	27.9 12.9	
	37 54.4	31 45.6	68 73.1
	74.0 39.8	72.1 33.3	
COLUMN TOTAL	50 53.8	43 46.2	93 100.0

CORRECTED CHI SQUARE = 0.00077 WITH 1 DEGREE OF FREEDOM
SIGNIFICANCE = 0.9779

Table VII: 2-WAY CHI-SQUARE ANALYSIS OF READING LEVEL BY DOMINANCE

COUNT ROW PCT COL PCT TOT PCT	DOMINANCE	NON-DOMINANCE	ROW TOTAL
DISABLED	7	6	13
BOY READERS	53.8 21.2 12.7	46.2 27.3 10.9	23.6
SUPERIOR	26 61.9	16 38.1	42 76.4
BOY READERS	78.8 47.3	72.7 29.1	
COLUMN TOTAL	33 60.0	22 40.0	55 100.0

CORRECTED CHI SQUARE = 0.03777 WITH 1 DEGREE OF FREEDOM
SIGNIFICANCE = 0.8459

All hypotheses were confirmed as stated. In other words, no significant differences had been shown to exist between reading disabled boys and reading disabled girls; between a reading disabled population and a superior reading population; and between reading disabled boy-readers and superior boy-readers.

The third and last physiological theory to be tested was the "Vulnerability of the Male Organism" theory. This theory describes the male organism as much more vulnerable to stress and trauma than the female organism. It is this vulnerability which is purported to account for the uneven sex ratio in reading performance. This theory was tested in the form of the following 2 null hypotheses.

Hypothesis IV -

(a) An analysis of the medical records of kibbutz boys and girls in grades 2 and 5 defined as reading disabled will not disclose a higher proportion of overall pathology for the boys as compared to the girls.

(b) An analysis of the medical records of kibbutz boys and girls defined as superior readers will not disclose a greater proportion of overall pathology for the boys as compared to the girls.

The same 13 pathological indicators employed by Bentzen in support of her theory, was employed in this study. A T-test was performed on the mean scores of frequency in pathological occurrence. The following results were found:

TABLE VIII: DISTRIBUTION OF MEAN SCORES BY SEX ON A 13-POINT PATHOLOGY INDEX FOR A KIBBUTZ READING DISABILITY POPULATION

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VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	POOLED VARIANCE ESTIMATE		
					T	DEG. OF VAL. FREEDOM	2-TAIL PROB.
GROUP 1	14	1.3571	1.336	0.357	-2.31	24	0.030
GROUP 2	12	2.6667	1.557	0.449			

TABLE IX: DISTRIBUTION OF MEAN SCORES BY SEX ON A 13-POINT
PATHOLOGY INDEX FOR A KIBBUTZ SUPERIOR READING
POPULATION

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	POOLED VARIANCE ESTIMATE		
					T	DEG. OF VAL. FREEDOM	2-TAIL PROB.
GROUP 1	43	0.6744	0.747	0.114	-1.61	67	0.111
GROUP 2	26	0.9615	0.662				

Hypothesis IV (a) is not accepted as stated. A significant difference was found but with contrary findings. It was the girls rather than the boys who demonstrated the greatest frequency of pathology.

Hypothesis IV (b) is accepted as stated. No significant difference was found between superior boy-readers and superior girl-readers in terms of frequency of occurrence of these thirteen pathologies.

SUMMARY

The general aim of this investigation was to test a long-standing assumption in Education; namely, that reading ability in elementary grades is differentiated by sex. The direction of difference tends to favor girls as superior to boys in learning to read. Biological theories of innate differences have been offered as purported explanation of this phenomenon.

Results of this investigation of elementary grades within an Israeli kibbutz system demonstrated no differences in gender with regard to performance in reading level and readiness to read.

In addition, no gender differences were evident in the frequency of occurrence of reading disability and maturational lag, mixed dominance and twelve selected indices of psychopathology in children. The general and specific results of this study do not lend support to current biological theories purporting to explain girls' superiority in reading.

The kibbutz clinic was an ideal place in which to gather data on sex differences in numerous pathologies. It offers a rare opportunity to discover a closer estimate of prevalence as compared to incidence of pathology.

One explanation for this advantageous position of the kibbutz clinic is the completeness and accuracy of health records. Through an investigation of the written records, the characteristics and problems of kibbutz children can be traced rather accurately from infancy to youth.

Records include recorded observations of "metaplot" and teachers, as well as medical records. In this respect, the high rate of population stability in the average kibbutz constitutes a supplementary asset (Kaffman, 1965).

An additional advantage is the form of education. "Collective" education gives a more positive guarantee of early diagnosis than any other form of education. Since the child grows up in a children's home, he or she is under observation by an objective eye from the first days of life. Infant nurses, whose approach is more objective and less affective than that of parents, can be helpful to the latter in connection with overcoming their reluctance to consult the experts. In a non-kibbutz family it is sometimes realized only late that the child is handicapped, particularly a first child, because there is no other child against whom to compare his/her development. Even when the parents sense that all is not well, they tend to overlook this, to delude themselves, it is so difficult to face the bitter truth and turn for help.

A third advantage of kibbutz clinical data when attempting to determine "prevalence" rather than "incidence" of pathology, is the accessibility of the clinic to all members of the kibbutz population. There is no discrimination on the basis of financial resources, social status or sex as exists in our society.

Abundant examples of the unreliability of percentage of pathologies in American clinics, due to social and sexual biases can be found in a new book just published by Nicholas Hobbs.¹ He charges sexual biases when classifying the "mentally retarded" and "emotionally disturbed."

¹Nicholas Hobbs, The Futures of Children: Categories, Labels and Their Consequences (San Francisco, California: Jossey Bass, April, 1975), pp. 19-41.

More boys were brought to educational or legal authorities for evaluation and such actions were generally taken at least two years sooner for males than for females of the same mental age; girls segregated as mentally deficient were more defective than boys so segregated; fewer girls were segregated than boys; and the girls who were segregated had remained in the general population longer than the boys. Clearly, boys who deviated from the norm were less tolerated in the home, school, or community than girls.

Recent data gathered from elementary and secondary school teachers suggest that there is still greater tolerance of deviant behavior among females than among males (Herson, 1972; Phillips, 1964; Yamamoto and Dizney, 1967; Gurin, Veroff and Feld, 1960).

In American clinics we do not have data on the number of children who may actually experience reading disability, but rather upon those subjects whom someone saw fit to take action of one sort or another thereby making these cases accessible to researchers.

The true prevalence of reading disability is not known yet. The kibbutz clinic is more likely to approximate it closer than clinics in the U.S.A. and other Western countries.

IMPLICATIONS

The general intent of this research was to aid in the improvement of reading performance for boys in the elementary grades and concurrently enhance their self-image as students. This investigation into the kibbutz culture disclosed an equally high quality performance level for both sexes, which in part may be attributed to cultural influences. This finding should contribute to a rethinking of prevailing attitudes and practices in societies where boys demonstrate difficulties in reading. In particular, this may give educators pause to reconsider current popular recommendations such as delayed school entrance for boys and sex-grouped reading instruction (Stauffer, 1968; Hurley, 1965; Strickler, 1971). The underlying purposes for such approaches are to alleviate the lowered self-esteem experienced by boys.

Paradoxically, however, the converse tends to be true. These practices, I suspect, would crystallize what, initially may have been fairly pliant cultural distinctions between the sexes thereby contributing additional impetus to a pervasive stereotyping. Such stereotyping, regardless of its origin or intent can only delimit individual freedom.

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